

Volume 5  
1972  
Indexes

Journal of  
Physics C

QC  
176  
A1  
J63

# Solid State Physics

U. of ILL. LIBRARY

MAR 5 1973

CHICAGO CIRCLE



A Europhysics Journal  
published by  
The Institute of Physics

# Journal of Physics C: Solid State Physics

## Honorary Editor

Dr A B Lidiard

## Editorial Board

Dr I G Austin  
Professor F Bassani  
Mr J R A Beale  
Professor P N Butcher  
Professor R A Cowley  
Dr R J Elliott  
Professor C H L Goodman  
Professor S Lundqvist  
Professor N H March  
Professor S D Smith

## International Advisory Board

Professor L Genzel  
Dr Yu Kagan  
Professor T Matsubara  
Professor Sir Nevill Mott  
Professor W Paul  
Professor F Seitz  
Professor R Simmons

## Managing Editor

Dr D G Fisher

## Assistant Editor

Dr R J Palmer

The Institute of Physics  
Netherton House  
Marsh Street  
Bristol  
BS1 4BT  
England

Copyright © 1972 by The Institute of Physics and individual contributors. All rights reserved. Multiple copying of the contents of parts thereof without permission is in breach of copyright, but permission is hereby given to copy titles and abstracts of papers and names of authors. Permission is usually given upon written application to the Institute to copy illustrations and short extracts from the text of individual contributions, provided that the source (and, where appropriate, the copyright) is acknowledged

## Subscription Information

Journal of Physics C: Solid State Physics is published twenty four times a year by The Institute of Physics, 47 Belgrave Square, London, SW1X 8QX, England, in association with the American Institute of Physics, and is printed in Great Britain by Page Bros (Norwich) Limited, Norwich. Second class postage paid at New York, NY 10001, USA.

The public subscription rates for all countries except the United States, Canada and Mexico is £60 per annum (air mail rates on application), and orders should be sent to:

Physics Trust Publications  
Blackhorse Road  
Letchworth  
Herts  
England

The rate for North America by airfreight is US \$162.00 per annum. Orders from North American countries (except for back issues of previous volumes and single copies) should be sent to:

American Institute of Physics  
335 East 45th Street  
New York  
NY 10017  
USA

The single issue price is £3.50 (US \$9.45). All orders for single issues of the current volume should be sent to:

Physics Trust Publications  
Blackhorse Road  
Letchworth  
Herts  
England

All orders for back issues should be sent to:

Wm Dawson and Sons Ltd  
Back Issues Department  
Cannon House  
Park Farm Road  
Folkestone  
Kent  
England

Journal of Physics C: Solid State Physics

Volume 5, 1972

Solid  
State  
Physics



Journal of Physics  
published by  
The Institute of Physics





Digitized by the Internet Archive  
in 2024

Volume 5  
1972  
Pages L1-324, 1-3616

Journal of  
Physics C

# Solid State Physics



A Europhysics Journal  
published by  
The Institute of Physics

Copyright © 1972 by The Institute of Physics and individual contributors. All rights reserved. Multiple copying of the contents or parts thereof without permission is in breach of copyright, but permission is hereby given to copy titles and abstracts of papers and names of authors. Permission is usually given upon written application to the Institute to copy illustrations and short extracts from the text of individual contributions, provided that the source (and, where appropriate, the copyright) is acknowledged.

Published by Institute of Physics, 47 Belgrave Square, London SW1X 8QX in association with the American Institute of Physics.

Printed in Great Britain, Page Bros, Norwich. Set in 10/12 pt Times New Roman.

# Journal of Physics C: Solid State Physics

## Honorary Editor

A B Lidiard MSc PhD DSc FInstP

## Editorial Board

I G Austin MA ScD

Professor F Bassani FInstP

J R A Beale MA FInstP CEng MIEE

Professor P N Butcher PhD

Professor R A Cowley MA PhD FRSE

R J Elliott MA DPhil *Deputy Chairman*

Professor C H L Goodman MA FInstP

Professor S Lundqvist PhD

Professor N H March PhD

Professor S D Smith PhD DSc FInstP FRMetSoc

## International Advisory Board

Professor L Genzel PhD

Yu Kagan PhD

Professor T Matsubara

Professor Sir Nevill Mott FRS DSc MA FInstP

Professor W Paul MA PhD AM

Professor F Seitz PhD DSc LLD FAmPhysSoc

Professor R Simmons MA PhD FAmPhysSoc

## Managing Editor

D G Fisher PhD FInstP

## Assistant Editor

R J Palmer DPhil







# Contents

## NO 1 17 JANUARY 1972

### LETTERS TO THE EDITOR

- L1** *M F Thomaz, Marila F Thomaz and C L Braga* · Decay times of the 415 and 503 nm fluorescence bands of type I diamonds under ultraviolet excitation  
**L5** *I M Boswarva* · Further calculations of the energies of formation of Schottky defects in NaCl structure ionic crystals.

### PAPERS

- 1** *A McKerrell and R G Bowers* · Critical phenomena with many body interactions: an exactly soluble model system  
**5** *F A Buot* · On the relaxation rate spectrum of phonons  
**15** *M R Hayns* · Tests of the CNDO method for the band structure of crystalline solids: I. Calculations on lithium fluoride  
**21** *C Caroli, R Combescot, P Nozieres and D Saint-James* · A direct calculation of the tunnelling current: IV. Electron-phonon interaction effects  
**43** *R Jones and W Schaich* · Theory of impurity band hopping conduction  
**55** *C G Gray and H I Ralph* · Solution of Boltzmann's equation for semiconductors using a spherical harmonic expansion  
**63** *C E T Gonçalves da Silva and L M Falicov* · Theory of magnetic properties of rare earth compounds  
**77** *D J Thouless* · A relation between the density of states and range of localization for one dimensional random systems  
**82** *V Ausin and J L Alvarez Rivas* · Thermoluminescence and annealing of F centres in KCl  $\gamma$  irradiated at room temperature

## NO 2 31 JANUARY 1972

### LETTERS TO THE EDITOR

- L9** *M A Moore and J E T Trainin* · Spin dependence of critical indices in the two dimensional Ising model  
**L13** *M A Ball* · The electronic structure of disordered systems: II. The nature of the localized states

### PAPERS

- 97** *D G Pettifor* · First principle basis functions and matrix elements in the H-NFE-TB representation  
**121** *G E Stedman* · Phonon-induced shift of spectral lines: I. General theory  
**134** *A R Allnatt and S J Sime* · The polarization impedance of sodium chloride crystals  
**147** *P H Melville* · Currents in rough surfaces of type II superconductors  
**159** *M Costato and L Reggiani* · Nonparabolicity and overlap effects on transport problems in the Froehlich and Paranjape approach  
**187** *B K Ridley, J J Crisp and F Shishiyani* · Slow domains and negative resistance via the enhanced capture of transferred electrons in n type GaAs  
**199** *R S Sussmann and B K Ridley* · The growth of acoustoelectric current in GaAs  
**212** *K Fletcher and P N Butcher* · An exact solution of the linearized Boltzmann equation with applications to the Hall mobility and Hall factor of n-GaAs  
**225** *V Heine and C H Hodges* · Theory of the surface dipole on nontransition metals  
**231** *J Oitmaa and I G Enting* · Critical behaviour of the anisotropic Ising model  
**245** *J J Davies, S R P Smith, J Owen and B F Hann* · ENDOR measurements of spin transfer in  $(VF_6)^{4-}$

## NO 3 14 FEBRUARY 1972

### LETTERS TO THE EDITOR

- L17** *F K Schulte and H Bross* · Note on the band theory of the quantum size effect  
**L19** *L Eaves, R A Stradling, S Askenazy, G Carère, J Leotin, J C Portal, and J P Ulmet* · An investigation of the conduction band edge in CdSe by the magnetophonon effect

### PAPERS

- 257** *J H Beaumont, A L Harmer and W Hayes* · The  $F_3$  centre in alkaline earth fluorides: I  
**266** *J H Beaumont, A L Harmer and W Hayes* · The  $F_3$  centre in alkaline earth fluorides: II  
**275** *J H Beaumont, A L Harmer and W Hayes* · The  $F_3^-$  centre in  $\text{CaF}_2$  and  $\text{SrF}_2$   
**279** *N Kristianpoller and Z Davidson* · On the uv excitation of thermally stimulated conductivity in KBr and KI crystals  
**287** *O Litzman, M Bartušek and V Zavadil* · Lattice dynamics of a crystal containing a point defect with a long range interaction  
**293** *L S Kothari and U Singhal* · Lattice dynamics of sodium—comparison of de Launay and CGW models  
**300** *F Cyrot-Lackmann* · Spectral limits in disordered systems  
**306** *H U Rahman* · Optical intensities of trivalent erbium in various host lattices  
**316** *H A Brown* · On classical-spin biquadratic exchange  
**319** *C F Osborne* · Spin wave theory of a dilute anisotropic Heisenberg ferromagnet  
**330** *C R Jeggo* · Nonlinear optics and optical activity  
**338** *E A Harris* · EPR of  $\text{Mn}^{2+}$  pairs in MgO and CaO

## NO 4 29 FEBRUARY 1972

### LETTERS TO THE EDITOR

- L23** *M A Ball* · The validity of the KKR equations for overlapping potentials

### PAPERS

- 353** *M I Barker and T Gaskell* · Velocity autocorrelation function and diffusion coefficient in a liquid: II  
**366** *H Gobrecht and F Mahdjuri* · Switching and memory effects in liquid selenium  
**374** *N Giovannini and J Muggli* · Elastic interaction of point defects in a cubic continuum; analytic expressions for the [110] direction  
**379** *A R Bean, S R Morrison, R C Newman and R S Smith* · Electron irradiation damage in silicon containing high concentrations of boron  
**401** *Y V G S Murti and C S N Murthy* · Vacancy pair formation energies with the CsCl structure  
**408** *R Dupree and M A Smithard* · The electronic properties of small metal particles: The electric polarizability  
**415** *N E Hill* · The theories of complex permittivity  
**425** *Z Sümengen and G A Saunders* · The thermomagnetic tensor and the Umkehr effect in bismuth  
**435** *J Oitmaa* · Critical behaviour of a generalized Ising model  
**450** *M J Metcalfe and H M Rosenberg* · The magnetothermal resistivity of antiferromagnetic crystals at low temperatures: I.  $\text{DyPO}_4$ , a nearly ideal Ising system  
**459** *M J Metcalfe and H M Rosenberg* · The magnetothermal resistivity of antiferromagnetic crystals at low temperatures: II.  $\text{GdVO}_4$ , a nearly ideal Heisenberg system  
**474** *M J Metcalfe and H M Rosenberg* · The magnetothermal resistivity of antiferromagnetic crystals at low temperatures: III.  $\text{ErVO}_4$ , a new antiferromagnet  
**481** *J F B Hawkes and R W Teale* · Spontaneous and photoinduced linear dichroism in silicon doped yttrium iron garnet  
**493** *T P Martin* · Calculated impurity induced Raman scattering in CsCl  
**502** *M R Brown, A F J Cox, W A Shand and J M Williams* · Sensitization of rare earth photoluminescence in II–VI compounds: II. Site sensitive excitation mechanisms in zinc selenide  
**511** *C J Radford, W E Hagston and F J Bryant* · Electron temperatures deduced from comparative studies of photo- and cathodoexcitation of free-to-bound emission  
**518** *S Clough, J Hill and F Poldy* · Methyl group tunnelling rotation frequency in  $\gamma$ -irradiated methyl malonic acid crystals



## NO 5 14 MARCH 1972

### LETTERS TO THE EDITOR

- L27** *D Richardson* · The effect of displacement on energy gap bowing in zincblende semiconductor alloys  
**L31** *M B Salamon* · Electrical resistivity at antiferromagnetic transitions  
**L35** *A K Cheetham and B E F Fender* · Neutron diffraction study of nonstoichiometric cerium hydride

### PAPERS

- 529** *R de Wit* · Partial disclinations  
**535** *R W Munn* · Rôle of the elastic constants in negative thermal expansion of axial solids  
**543** *H H Lal and M P Verma* · Lattice dynamics of rubidium halides  
**549** *G J Rees* · Diamagnetic excitons in degenerate bands  
**562** *R C Birtcher, P W Deutsch, J F Wendelken and A B Kunz* · Valence band structure in silver fluoride  
**567** *P N Butcher and H M Janus* · The linear theory of acoustoelectric oscillators with arbitrary static field distributions  
**582** *J Slechta* · A nonlinear theory of acoustoelectric phenomena. Saturation study—Application to thin AE oscillator  
**595** *A D Bruce and R A Cowley* · The two phonon Raman spectra of alkali halide crystals  
**606** *H Nara and M Schlesinger* · Analysis of the spectra of  $\text{Dy}^{3+}$  doped calcium fluoride  
**615** *J Poirtreaud et F I B Williams* · Résonance et relaxation électronique à 300 MHz du praseodyme trivalent dans le double nitrate de lanthane et de magnésium  
**631** *J L Carolan, S Clough, N D McMillan and B Mulady* · Proton relaxation and hyperfine structure due to tunnelling methyl groups

## NO 6 28 MARCH 1972

### LETTERS TO THE EDITOR

- L41** *S Andersson and J B Pendry* · Surface structures from low energy electron diffraction  
**L46** *S R Morrison, R C Newman and F Thompson* · A radiation damage centre in gallium phosphide containing boron  
**L50** *R Folland and J H Strange* · Pressure dependence of self diffusion in the plastic crystals hexamethyl-ethane, norbornylene and cyclohexane  
**L56** *R Harris* · The Dirac matrix for spherically symmetric potentials  
**L58** *A Briguët et A Erbeia* · Détermination indirecte du temps de relaxation spin-réseau du silicium 29 dans le trichlorosilane

### PAPERS

- 641** *H D Rees* · Numerical solution of electron motion in solids  
**657** *B Vinter* · Computer simulation of the acoustoelectric oscillator  
**664** *J J Field* · Ferromagnetism in a narrow-band solid  
**676** *J E Lowther* · Anisotropic spin-orbit coupling of rare earth ions in crystal fields  
**680** *W E Hagston* · Theoretical formulation of the effects of charge transfer states on optical transitions in  $s^2$  ions  
**691** *W E Hagston* · Theory of the fine structure of the uv absorption of heavy metal ions in the alkali halides  
**702** *S Rakshit, S N Biswas and A N Chakravarti* · Spontaneous emission spectrum in n type GaAs of different doping concentrations excited by a 40 kV electron beam at 300 K  
**709** *A E Hughes, G P Pells and E Sonder* · Symmetry assignments of one-phonon sidebands in the emission spectrum of the  $\text{F}^+$  centre in calcium oxide  
**716** *R C Kemp* · Paramagnetic resonance of  $\text{CdS:Fe:Ag}$

## NO 7 13 APRIL 1972

### LETTERS TO THE EDITOR

- L65** *T Kaneyoshi and R Honmura* · Spin wave theory of amorphous ferromagnets  
**L70** *T B Grimley and B J Thorpe* · Exact and approximate ground state energy of Hubbard's hamiltonian for surface molecules

## PAPERS

- 721 *P Lucas and A J Hillel* · Coupling from second to first sound in uniformly rotating liquid helium  
 732 *J Killingbeck* · Generators and integrity bases for some point groups  
 738 *R A Bromley and R B Murray* · The band structures of some transition metal dichalcogenides: I. A semiempirical tight binding method  
 746 *R B Murray, R A Bromley and A D Yoffe* · The band structures of some transition metal dichalcogenides: II. Group IVA: octahedral coordination  
 759 *R A Bromley, R B Murray and A D Yoffe* · The band structures of some transition metal dichalcogenides: III. Group VI A: trigonal prism materials  
 779 *A Gainotti and C Ghezzi* · Surface effects on positron annihilation in elementary semiconductors  
 787 *C Billington* · Phosphorescence mechanisms in ZnS: Cu  
 791 Corrigenda

## NO 8 27 APRIL 1972

## LETTERS TO THE EDITOR

- L73 *R B Dennis, R A Wood, C R Pidgeon, S D Smith and J W Smith* · Fundamental loss mechanisms of the spin-flip Raman laser  
 L80 *J D Gibbon and R K Bullough* · Theory of the Schwarz–Hora effect  
 L85 *T Egami* · Effect of zero-point energy on magnetocrystalline anisotropy of the rare earth metals  
 L89 *P S Allen, W Harding and P Mansfield* · Quasiquadrupolar echoes from solids containing only  $I = \frac{1}{2}$  spins

## PAPERS

- 793 *V B Sapre and C Mande* · Chemical shifts in the K absorption discontinuity of arsenic  
 798 *R Subramanian and K V Bhagwat* · The relativistic Tamm model  
 807 *J T Edwards and D J Thouless* · Numerical studies of localization in disordered systems  
 821 *D Richardson and R Hill* · The origins of energy gap bowings in substitutional semiconductor alloys  
 828 *H-K Liu, R I Joseph and P E Wagner* · Theory of the spin–phonon avalanche in paramagnetic crystals: I. Spatial phonon transport  
 843 *H-K Liu, R I Joseph and P E Wagner* · Theory of the spin–phonon avalanche in paramagnetic crystals: II. Spectral diffusion of magnetic energy  
 852 *J R Fletcher* · A variational groundstate for the dynamic Jahn–Teller effect  
 863 *D Marsh* · Distortions of  $\text{Tm}^{2+}$  trigonal centres in alkaline earth fluorides  
 871 *R A George, D H Martin and E G Wilson* · The ultraviolet spectra of polyethylene and long-chain paraffins  
 879 *A T Davidson and A F Vickers* · The optical properties of mica in the vacuum ultraviolet  
 888 Corrigendum

## NO 9 10 MAY 1972

## LETTERS TO THE EDITOR

- L95 *Y Sasaki, C Hamaguchi and J Nakai* · Electroreflectance of CaSe single crystals in higher interband transition region  
 L99 *A A Gomes, A P Guimaraes and L Iannarella* · Remarks on Gd g shifts  
 L102 *M A B Whitaker* · Chemical shifts in Auger spectra

## PAPERS

- 889 *G M Bell* · Statistical mechanics of water: lattice model with directed bonding  
 906 *C E T Goncalves da Silva and L M Falicov* · Metal–insulator transitions: a coherent potential approximation  
 914 *M Saitoh* · Stark ladders in solids  
 928 *G P Srivastava and R M Mehra* · The free carrier magneto-microwave Kerr effect in p type germanium at 296 K and 77 K



- 933** *D C Rapaport* · Perturbation theory, scaling and the spherical model  
**956** *C Domb and G S Joyce* · Cluster expansion for a polymer chain  
**977** *A P Cracknell and A K Sedaghat* · The antisymmetrized squares and the symmetrized cubes of the irreducible corepresentations of the magnetic point groups  
**985** *J Killingbeck* · Singular matrix representations of point groups  
**990** *T B Smith* · Molecular motion in NMR: II

## NO 10 25 MAY 1972

### LETTERS TO THE EDITOR

- L107** *T Kaneyoshi* · On the possibility of a new type of amorphous ferromagnet  
**L110** *A M White, P J Dean, L L Taylor and R C Clarke* · The observation of strain effects in the photoluminescence spectrum of excitons bound to neutral acceptors in indium phosphide  
**L113** *R Coates and E W J Mitchell* · Tunnel assisted hopping in neutron irradiated gallium arsenide

### PAPERS

- 997** *D N Chambers and R C Newman* · Complexes of low symmetry involving hydride ions paired with trivalent rare earth ions in calcium fluoride  
**1008** *G C Cran and M J L Sangster* · Conditions on the elastic constants for rutile structure crystals  
**1017** *R E Shawyer and P Dean* · Atomic vibrations in orientationally disordered systems: I. A two dimensional model  
**1028** *R E Shawyer and P Dean* · Atomic vibrations in orientationally disordered systems: II. Hexagonal ice  
**1038** *H H Lal and M P Verma* · Lattice dynamics of CsCl, CsBr and CsI  
**1046** *B Yates, F R Cooper and A F Pojur* · Thermal expansion at elevated temperatures: II. Aluminium oxide: experimental data between 100 and 800 K and their analysis  
**1059** *T Fujita and J Hori* · Degree of localization in three dimensional disordered systems  
**1067** *K P Singh, R M Singru and C N R Rao* · Positron lifetimes and phase transitions in solids ·  
**1072** *P Leroux-Hugon and A Ghazali* · Contribution to the theory of the anomalous Hall effect: Influence of the band structure on the skew scattering  
**1082** *S M Bose and E-Ni Foo* · Density of spin waves states in disordered Heisenberg ferromagnetic chains  
**1089** *D J Newman* · Superexchange models: I. General theory  
**1101** *V Grasso, G Mondio and G Saitta* · Optical constants of MoTe<sub>2</sub> from reflectivity measurements

## NO 11 12 JUNE 1972

### LETTERS TO THE EDITOR

- L119** *P W Anderson, S T Chui and W F Brinkman* · Vacuum polarization and the force between two excitons  
**L124** *J M Kosterlitz and D J Thouless* · Long range order and metastability in two dimensional solids and superfluids  
**L127** *J Bernasconi, D Kuse, M J Rice and H R Zeller* · One dimensional conduction: a two dimensional problem  
**L131** *F J Wegner* · Duality relation between the Ashkin-Teller and the eight-vertex model  
**L133** *C R Jeggo* · Second harmonic generation in molybdates  
**L136** *C A Bates, S C Jones, V W Rampton and P Steggle* · Ferrous ions in ruby crystals

### PAPERS

- 1109** *J Keller and P V Smith* · The *T* matrix and the *K* matrix in cluster scattering  
**1123** *J H Denning and S D Ross* · The vibrational spectra and structures of rare earth oxides in the A modification  
**1134** *A Kessler and J E Caffyn* · An investigation of the thermal defect order, defect mobility, and defect complex formation in cadmium fluoride  
**1153** *L J Challis and C N Hooker* · The effect of electric and magnetic fields on the thermal conductivity of glass at low temperatures  
**1158** *A N Basu and S Sengupta* · Deformable shell model and the properties of LiF crystals

- 1165** *I Katz and S A Rice* · On the calculation of the density of localized states in a dense fluid  
**1183** *R A Abram and S F Edwards* · The nature of the electronic states of a disordered system: I. Localized states  
**1196** *R A Abram and S F Edwards* · The nature of the electronic states of a disordered system: II. Extended states  
**1207** *P Sah and A K Rajagopal* · Canonical density matrix for muffin tin potentials  
**1216** *M Vuorio* · The effect of low energy vibrational modes on the Kapitza resistance  
**1222** *A J McEvoy and R H Williams* · The low energy photoemission spectra of gallium sulphide  
**1226** *O Nagai, N L Bonavito and T Tanaka* · On the magnon interaction in haematite: I. Magnon energy of optical mode  
**1237** *D Bloor and J R Dean* · Spectroscopy of rare earth oxide systems: I. Far infrared spectra of the rare earth sesquioxides, cerium dioxide, and nonstoichiometric praseodymium and terbium oxides  
**1253** *M Kozielski, I Pollini and G Spinolo* · Electronic absorption spectra of  $\text{Ni}^{2+}$  in  $\text{NiCl}_2$  and  $\text{NiBr}_2$   
**1265** *A P G Hare, G Davies and A T Collins* · The temperature dependence of vibronic spectra in irradiated silicon

## NO 12 26 JUNE 1972

### LETTERS TO THE EDITOR

- L139** *C J Palin, W F Vinen and J M Vaughan* · The scattering of light by liquid helium close to the  $\lambda$  line  
**L143** *H Hoinkes, H Nahr and H Wilsch* · Gas atom-crystal surface potentials for (001) LiF  
**L146** *M Elices and F Yndurain* · Electronic surface states in Ge  
**L151** *J Lam* · Electron energy renormalization and resistivity in the s-d model  
**L154** *R F Frindt, R B Murray, G D Pitt and A D Yoffe* · Anisotropy in the resistivity of  $\text{NbS}_2$  with pressure  
**L157** *S R P Smith* · Soft modes in singlet ground state ferromagnets

### PAPERS

- 1277** *W S Howells and J E Enderby* · Effective pair potentials for liquid Na and liquid K  
**1284** *R I Jolly and J M Titman* · Longitudinal nuclear spin relaxation in liquid alloys of indium  
**1293** *J A Pryde and C G Titcomb* · Phase equilibria and kinetics of evolution of dilute solutions of hydrogen in niobium  
**1301** *J A Pryde and C G Titcomb* · Thermodynamic data of the hydrogen-niobium system  
**1309** *A W Hewat* · Vibrational amplitudes and Debye-Waller factors from elastic constants and Raman frequencies  
**1317** *C J Hearn* · Phonon softening and the metal-insulator transition in  $\text{VO}_2$   
**1335** *J Sak* · Statistical electron-hole correlation in disordered systems: interband transitions  
**1345** *E R Cowley* · The one-phonon Green function and the dielectric properties of sodium chloride  
**1360** *K W H Stevens* · Exchange interactions in rare earth chalcogenides  
**1375** *H L Scott Jr* · Critical concentration against interaction range: II  
**1383** *M R Bhagavan and C Blomberg* · Selfconsistent singularities of the static correlation function at the critical point  
**1399** *C Domb* · Term structure of series expansions for the Ising and classical vector models and dilute magnetism  
**1417** *C Domb* · Weighting of graphs for the Ising and classical vector models  
**1429** *D S Gaunt and M F Sykes* · Re-analysis of the critical isotherm of the Ising ferromagnet  
**1445** *R Bhandari and L M Falicov* · Theory of the magnon sidebands in optical transitions of antiferromagnetic insulators  
**1461** *M G Cottam* · Theory of two-magnon Raman scattering in antiferromagnets at finite temperatures  
**1475** *J H Beaumont, A L Harmer and W Hayes* · An investigation of  $\langle 100 \rangle$  and  $\langle 110 \rangle$  oriented  $\text{F}_2$  centres in  $\text{CaF}_2$  and  $\text{SrF}_2$   
**1489** *J H Beaumont, A L Harmer, W Hayes and A R L Spray* · Zero-phonon lines in  $\text{CaF}_2$  and  $\text{SrF}_2$   
**1501** *R T Harley, W Hayes and S R P Smith* · Raman scattering investigations of Jahn-Teller induced phase transitions in  $\text{TmAsO}_4$  and  $\text{TmVO}_4$   
**1511** *S C Jain, A V R Warriar and H K Sehgal* · Vibrational and electronic properties of  $\text{Co}(\text{CN})_6^{3-}$  doped in alkali halides  
**1519** *A J Lindop, I J Barton and D W Goodwin* · The stimulated emission cross section for the trivalent neodymium ion in single crystal calcium aluminate

- 1526** *C J Radford, W E Hagston and F J Bryant* · Analysis of the effects of electron damage on the bound-to-bound emission intensity of cadmium sulphide
- 1537** *I M Blair, D Pooley and D Smith* · The lifetimes of fast recombination luminescence transitions in alkali halides

## NO 13 10 JULY 1972

### LETTERS TO THE EDITOR

- L163** *S Simons* · Thermal conductivity anisotropy in solid helium
- L166** *F W Sheard and G A Toombs* · Transfer hamiltonian approach to Kapitza resistance
- L169** *Shih-Yu Feng* · A note on Andrew's second moment correction formula
- L171** *A Kyselka* · Note on the SCF theories of the polymer excluded volume problem

### PAPERS

- 1553** *M R Buckton and D Pooley* · The radiation damage process in  $\text{MgF}_2$
- 1563** *P S Cheung and C J Hearn* · The diffusion of electrons in semiconductors in high electric fields
- 1573** *J M Machado da Silva, J M McDermott and R W Hill* · The low temperature specific heats of some Laves phases containing neodymium
- 1584** *J M Machado da Silva and R W Hill* · The electronic specific heats of  $\text{CeNi}_2$  and  $\text{CeCo}_2$
- 1589** *A D Redmond and B Yates* · The low temperature thermal expansion of thallous chloride and thallous bromide
- 1604** *P Bryce and J C Kelly* · Charged particle sputtering: distortion of trajectories by the incident beam field
- 1615** *R O Jones* · Model calculation of surface states in silicon
- 1629** *U von Barth and L Hedin* · A local exchange-correlation potential for the spin polarized case: I
- 1643** *M R Halse and K M Salleh* · The temperature dependence of the critical current of a double Josephson junction
- 1649** *A Aldea* · On the Hall effect in hopping impurity conduction
- 1657** *J R Barker* · The oscillatory structure of the magnetophonon effect: I. Transverse configuration
- 1675** *D W Wood and N W Dalton* · High temperature series expansions for the anisotropic Heisenberg model
- 1687** *I G Austin* · Optical properties of the small polaron in high electric fields
- 1705** *J F B Hawkes and M J M Leask* · Spectroscopic study of  $\text{Er}^{3+}$  —  $\text{Gd}^{3+}$  interaction in  $\text{Er}:\text{GdAlO}_3$
- 1716** *B V Shulgin, K N R Taylor, A Hoaksey and R P Hunt* · Optical characteristics of  $\text{Tb}^{3+}$  ions in soda glass
- 1727** *A M White, P J Dean, L L Taylor, R C Clarke, D J Ashen and J B Mullin* · The photoluminescence spectrum of bound excitons in indium phosphide and gallium arsenide
- 1739** *S Clough, J Hill and F Poldy* · Tunnelling sidebands of methyl group hyperfine structure

## NO 14 24 JULY 1972

### LETTERS TO THE EDITOR

- L175** *J S Rousseau, J C Stoddart and N H March* · The electrical resistivity of liquid metals
- L178** *S E Barnes* · Generalization of the drone fermion method
- L181** *D W Wood* · A self dual relation for a three dimensional assembly

### PAPERS

- 1745** *D J Edwards and J Jarzynski* · Ion-ion potentials in liquid metals
- 1757** *J Harris* · The effect of short range correlations on surface plasmon dispersion
- 1773** *W B Waeber* · A contribution to the theory of lattice vibrations
- 1799** *C M Care* · One dimensional hydrogen atom with a repulsive core
- 1806** *H M Gupta and U N Upadhyaya* · Rôle of paramagnetic impurities in the barrier region for superconducting tunnelling
- 1817** *P N Butcher* · On the rate equation formulation of the hopping conductivity problem
- 1830** *D C Rapaport* · The Ising ferromagnet with impurities: a series expansion approach: I
- 1859** *A Stevens* · Antiferromagnetic dispersion, absorption and light scattering in  $\text{NiO}$  and other face centred cubic crystals
- 1876** *J Kötztler* · Two-step crossrelaxation in ruby: evidence for generalized thermodynamics

- 1883** *A Grimm* · Infrared absorption by point defects in gallium arsenide  
**1893** *G D Holah* · Optical phonons and polaritons in  $\text{ZnSiP}_2$   
**1903** *D C Champeney and D F Sedgwick* · Investigation of molecular motion in some organic glasses and supercooled liquids by Mössbauer scattering  
**1914** *F J Bryant and P S Manning* · Selenium displacement and the infrared cathodoluminescence of zinc selenide

## NO 15 7 AUGUST 1972

### LETTERS TO THE EDITOR

- L185** *K Hölzl and C Schmid* · Localized and resonance modes in polyethylene below  $700\text{ cm}^{-1}$  due to kinks and folds  
**L188** *José R Leite, José R Pereira, Luiz G Ferreira* · On the inclusion of Coulomb correlation effects in atomic and band structure calculations  
**L191** *R H Williams, I G Higginbotham and M A B Whitaker* · Adsorption anisotropy in layer chalcogenides  
**L194** *Ingo Peschel, Marjorie Klenin and Peter Fulde* · On the excitation spectrum of van Vleck paramagnets  
**L197** *B G Turrell, P D Johnston and N J Stone* · The observation of the spin-flop transition in antiferromagnetic  $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$  by nuclear orientation

### PAPERS

- 1921** *A W Lees and S F Edwards* · The computer study of transport processes under extreme conditions  
**1930** *B R Watts* · A theoretical derivation of the strain probability distribution in dislocated materials  
**1943** *M Papoular* · On thermal expansion of glasses at low temperature  
**1945** *C Jouanin and C Gout* · Valence band structure of magnesium fluoride by the tight-binding method  
**1953** *V Halpern and A Bergmann* · Calculation of electronic Green functions using nonorthogonal basis functions: application to crystals  
**1969** *V Rossiter* · The relative permittivity transition in solid camphor  
**1976** *J A Elliott* · The first and second order Schwarz–Hora effects  
**1985** *M Jaros* · Many-band pseudopotential calculation of photoionization of zinc in silicon  
**1991** *E Loh* · Thermally modulated absorption of  $\text{Fe}^{2+}$  ions in micas, vivianite and olivine  
**1999** *F Thompson and R C Newman* · Localized vibrational modes in gallium arsenide containing silicon and boron  
**2011** *M Buchanan, W J L Buyers, R J Elliott, R T Harley, W Hayes, A M Perry and I D Saville* · Two-magnon Raman scattering and infrared absorption in  $(\text{MnZn})\text{F}_2$   
**2027** *P J Becker, M J M Leask and R N Tyte* · Optical study of the cooperative Jahn–Teller transition in thulium vanadate,  $\text{TmVO}_4$   
**2037** *J Killingbeck* · On the double vierergruppe  
**2045** *M C M O'Brien* · The dynamic Jahn–Teller effect, with many frequencies: a simple approach to a complicated problem  
**2064** *J W Tucker* · Theory of acoustic attenuation in a concentrated paramagnetic crystal: spin  $\frac{1}{2}$  system  
**2077** *P D Johnston, R A Fox and N J Stone* · Mixed magnetic dipole and electric quadrupole hyperfine interactions studied by nuclear orientation with and without nuclear magnetic resonance

## NO 16 21 AUGUST 1972

### LETTERS TO THE EDITOR

- L201** *C S G Cousins* · Standard choice of axes for crystal class  $\bar{6}m2$ , with reference to elastic and piezoelectric properties  
**L204** *S Clough* · The independence of methyl group rotation and proton spin symmetry in crystals  
**L209** *F Cyrot-Lackmann and M Cyrot* · Cluster effects in disordered systems  
**L213** *L Dagens* · The ion–electron–ion interaction according to the neutral atom model  
**L216** *A Sukiennicki, R Swirkowicz and L Adamowicz* · On spin waves in the spin-density wave ground state  
**L218** *C Leonardi, A Messina and F Persico* · Ground state of the spin–phonon interaction  
**L223** *F Thompson and R Nicklin* · Localized vibrational modes due to isotopes of nitrogen in gallium phosphide



- 2226 *P Mansfield and P K Grannell* · High resolution pulsed nuclear double resonance analogue Fourier transform spectroscopy of dilute spins in solids
- 2230 *T F Smith, L E Delong, A R Moodenbaugh, T H Geballe and R E Schwall* · Superconductivity of NbSe<sub>2</sub> to 140 kbar

## PAPERS

- 2089 *B R Orton and R L T Street* · An x ray diffraction study of liquid mercury between 50°C and 150°C
- 2098 *W H Weinberg* · Atomic helium scattering and diffraction from solid surfaces
- 2105 *J L Williams and I L Stone* · Current noise in thin discontinuous films
- 2117 *I M Boswarva and P Pirouz* · The computer simulation of the geometry of electron channelling patterns
- 2129 *M Hortal and A J Leadbetter* · The low temperature thermal expansion and Grüneisen functions of tellurium
- 2138 *J S Brown* · A note concerning the anharmonic corrections to  $C_V/3Nk$  in the inert gas solids at high temperature
- 2149 *J Heinrichs and R O Jones* · On the existence of Stark ladders in finite crystals
- 2156 *P C Jain, S Bhatnagar and A Gupta* · Positron annihilation in some high polymers
- 2163 *A S Bender and D A Young* · Fermi surfaces in graphite-bromine, studied by Shubnikov-de Haas oscillations
- 2179 *G Burrasfata, G Faraci, G Giaquinta and N A Mancini* · Influence of the properties of the materials on junction tunnelling characteristics
- 2192 *P Joyes* · Influence of asymmetrical correlations in the secondary emission of solid compounds
- 2200 *J F B Hawkes and R W Teale* · Magnetization switching by infrared irradiation
- 2205 *M G Cottam* · Theory of dipole-dipole interactions in ferromagnets: III. Application to GdCl<sub>3</sub>
- 2217 *K W H Stevens* · Exchange interactions in magnetic insulators
- 2225 *J Duran, Y Merle d'Aubigné and R Romestain* · Jahn-Teller coupling in the excited level of the F<sup>+</sup> centre in CaO: uniaxial stress effect
- 2246 *A Furrer, J Kjems and O Vogt* · Crystalline electric field levels in the neodymium monopnictides determined by neutron spectroscopy
- 2259 *J Drahoukoupil* · The x ray K emission bands in  $NB^{8-N}$  compounds of Cu, Zn, Ga and Ge
- 2267 *Y Hazony* · 3d(t<sub>2g</sub>) density distribution in covalent transition metal complexes from Mössbauer and NMR experiments
- 2276 *A J Barker* · The effect of melting on the multiphonon infrared absorption spectra of KBr, NaCl and LiF
- 2283 *F J Bryant and A T J Baker* · Threshold energy for tellurium displacement in zinc telluride

## NO 17 5 SEPTEMBER 1972

## LETTERS TO THE EDITOR

- 2233 *J L Stevenson and A C Skapski* · The crystal structure and linear electro-optic properties of *meta*-nitroaniline
- 2237 *C R A Catlow and M R Hayns* · A computational study of the F<sup>-</sup>-F<sup>-</sup> interionic potential
- 2241 *N Szabo* · On the Hall resistivity in solids and disordered systems
- 2247 *Takahito Kaneyoshi* · Hall coefficient in a narrow band: random phase model
- 2250 *R V Ditzian* · High temperature series for the susceptibility of the Ashkin-Teller model

## PAPERS

- 2289 *S F Edwards and J W Kerr* · The motion of polymer molecules in polymerized solids
- 2302 *I J Zucker and M B Doran* · High order multipole three-body forces and their contribution to the elastic constants and zero point energy of the rare gas crystals
- 2309 *D I Marsh and D H Martin* · Lattice vibrations of a polyethylene
- 2317 *M A Brown and Z Popovic* · Relaxation time analysis of thermal conductivity data using a computer
- 2323 *J Hubbard and P E Mijnarends* · The approximate calculation of electronic band structures: V. Wavefunctions
- 2333 *L Dagens* · A selfconsistent calculation of the rigid neutral atom density according to the auxiliary neutral atom model
- 2345 *W R Wampler and M Springford* · The lifetime of electrons in InSb, studied using the de Haas-van Alphen effect

- 2357 *A J Pindor* · Phonon-induced quadrupole potential in diamond-type semiconductors  
 2369 *M Combescot and P Nozières* · Condensation of excitons in germanium and silicon  
 2392 *R G Bowers and A McKerrell* · First order and critical point phase transitions in cooperative assemblies with many-body interactions: some exact results  
 2405 *M Giura, R Marcon, E Presutti and E Scacciatelli* · Magnetoacoustic oscillations in Sn-doped Bi with magnetic field orthogonal to the sound propagation: I. Experimental evidence and theoretical interpretation  
 2419 *Chhi-Chong Wu and Jensen Tsai* · Effects of longitudinal magnetic field on ultrasound in  $\text{SrTiO}_3$   
 2427 *F A Wedgwood* · Magnetic moment distribution in uranium monosulphide  
 2445 *H C Bolton, B S Lee and J W L Millar* · Spin-phonon interaction in the compressible Ising magnet: III  
 2460 *A J Guttman* · A lattice model of superantiferromagnetism  
 2468 *E Anastassakis and E Burstein* · Morphic effects: V. Time reversal symmetry and the mode properties of long wavelength optical phonons  
 2482 *J B Sokoloff* · Microscopic theory of modifications of first order Raman scattering caused by magnetic ordering  
 2497 *J Killingbeck* · Integrity bases for the crystal point groups  
 2503 *A G Mathewson and H P Myers* · The optical absorption of indium  
 2511 *K Hisano, F Placido, A D Bruce and G D Holah* · The dielectric response of alkali halide thin films  
 2523 *J Kaltseis, H A Posch and W Vogel* · Mössbauer effect observations with the 46.5 keV line of  $^{183}\text{W}$  in anhydrous lithium tungstate  
 2534 *Gordon Davies* · The effect of nitrogen impurity on the annealing of radiation damage in diamond  
 2543 *A E Hughes and G P Pells* · A new colour centre in calcium oxide: possible identification of the  $\text{F}\ddot{\text{A}}$  centre

## NO 18 19 SEPTEMBER 1972

### LETTERS TO THE EDITOR

- L253 *D W Wood and H P Griffiths* · A self dual relation for an Ising model with triplet interactions  
 L256 *M Müller and M J Norgett* · Xenon diffusion in caesium iodide  
 L261 *T Egami, O A Sacli, A W Simpson, A L Terry and F A Wedgwood* · Amorphous antiferromagnetism in iron and cobalt phosphorus pentoxide glasses

### PAPERS

- 2553 *G Robinson and N H March* · Effective van der Waals interaction between rare gas atoms in a dense classical fluid  
 2562 *Y P Varshni and A Konti* · The Houston method coefficients in an approximation of the Debye temperature for cubic crystals  
 2567 *J B Pendry* · Theory of averaged low energy electron diffraction data  
 2579 *T K Mitra* · On the Mott expression for the electron-phonon interaction  
 2583 *A A Cottley* · Solutions of Schrödinger's equation at a band edge in a one dimensional crystal  
 2591 *A A Cottley* · Band theory of the quantum size effect  
 2599 *J C Inkson* · Many-body effects at metal-semiconductor junctions: I. Surface plasmons and the electron-electron screened interaction  
 2611 *W J L Buyers, D E Pepper and R J Elliott* · Theory of spin waves in disordered antiferromagnets: I. Application to  $(\text{Mn}, \text{Co})\text{F}_2$  and  $\text{K}(\text{Mn}, \text{Co})\text{F}_3$   
 2629 *A Abragam, J F Jacquinot, M Chapellier and M Goldman* · Spin-lattice relaxation of Kramers doublets with hyperfine structure in cubic symmetry  
 2651 *M M Denisov and V P Makarov* · Polarization dependence of the two-photon absorption coefficient in crystals  
 2665 *G E Stedman* · Phonon-induced shift of spectral lines: II. Jahn-Teller splittings  
 2669 *F J Bryant, G K Goodwin and J E Lowther* · Emission spectrum of  $\text{Yb}^{3+}$  in cadmium sulphide

## NO 19 3 OCTOBER 1972

### LETTERS TO THE EDITOR

- L267 *R M Hill* · Carrier flow through localized states in amorphous materials

## PAPERS

- 2677 *D Steele, P E Childs and B E F Fender* · Defect structure of calcium fluoride containing excess anions: I. Diffuse scattering
- 2689 *D Vamanu* · On the lattice dynamics of interstitial impurities
- 2702 *Margaret M Elcombe* · The lattice dynamics of strontium fluoride
- 2711 *W G Stirling* · Neutron inelastic scattering study of the lattice dynamics of strontium titanate: Harmonic models
- 2731 *G K White* · Thermal expansion of trigonal elements at low temperatures: As, Sb and Bi
- 2746 *J J Harris and B K Ridley* · High field transport in p type PbTe
- 2757 *A P van Gelder, J Holvast, J H M Stoelinga and P Wyder* · Localized polariton modes of small cubic crystals
- 2762 *R G Farrer and L A Vermeulen* · Photoconductivity in irradiated diamond
- 2769 *S W Lovesey* · Theory of the magnon and phonon interaction in  $\text{FbF}_2$
- 2785 *L Reatto and E Rastelli* · Droplet model equation of state and correlation function for Ising and Heisenberg models
- 2805 *B J Last* · Percolation theory and the critical concentration of a dilute Heisenberg ferromagnet
- 2813 *D C Rapaport* · The Ising ferromagnet with impurities: a series expansion approach: II
- 2827 *Y V G S Murti and K R N Murthy* · Thermoluminescence of copper activated NaCl crystals
- 2834 *S Clough and B J Mulady* · Proton dipole-dipole relaxation due to quantum tunnelling motions

NO 20 17 OCTOBER 1972

## LETTERS TO THE EDITOR

- L271 *J E Sinclair* · Atomistic computer simulation of brittle-fracture extension and closure
- L275 *G F Alfrey and P H Borchers* · Phonon frequencies from the Raman spectrum of indium phosphide
- L279 *M I Bell* · Comment on singular matrix representations of point groups

## PAPERS

- 2845 *R Haydock, Volker Heine and M J Kelly* · Electronic structure based on the local atomic environment for tight-binding bands
- 2859 *C E Turner* · Hall mobility measurements on iron rich nickel ferrites from room temperature to 600°C
- 2867 *H Høgaard Jensen and Henrik Smith* · Geometrical effects in measurements of magnetoresistance
- 2881 *S G Patil* · AC conduction in tin disulphide single crystals
- 2887 *B C Tofield, A J Jacobson and B E F Fender* · Some magnetic properties of  $\text{BaPrO}_3$  and  $\text{BaTbO}_3$ : the magnetic form factor for  $\text{Tb}^{4+}$  by neutron diffraction
- 2896 *C K Majumdar, K Krishan and V Mubayi* · Excitation spectrum of an antiferromagnetic model
- 2903 *S V Ghatak* · Attenuation and frequency shift of acoustic waves in ferromagnetic insulators at low temperatures
- 2909 *A D Bruce* · Phonon-phonon interaction and two-phonon Raman scattering in NaCl
- 2921 *J R Dean and D Bloor* · Spectroscopy of rare earth oxide systems: II. Spectroscopic properties of erbium oxide
- 2941 *J M Dixon and R M Smith* · Anharmonicity and the Jahn-Teller effect
- 2949 *C A Bates, M J Oglesby and K J Standley* · The properties of  $\text{Co}^{2+}$  in zinc tungstate: I. The EPR spectrum and its interpretation
- 2961 *C A Bates, M J Oglesby and K J Standley* · The properties of  $\text{Co}^{2+}$  in zinc tungstate: II. Relaxation measurements and a calculation of  $T_1$
- 2976 Corrigendum

NO 21 31 OCTOBER 1972

## LETTERS TO THE EDITOR

- L283 *I J Ashburner and R C Newman* · Effect of ultraviolet irradiation on  $\text{CaF}_2$  containing trivalent rare earth-interstitial hydride ion pairs
- L287 *R A Cowley* · On the Raman scattering and two-roton bound states in liquid helium



## PAPERS

- 2977 *S P Isherwood and B R Orton* · An x ray diffraction investigation of molten copper-germanium alloys by the partial interference function method
- 2985 *S P Isherwood and B R Orton* · An x ray diffraction investigation of molten copper-indium alloys by the partial interference function method
- 2991 *G Paasch, A Schwerdtner and P Trepte* · Resistivity of liquid Mg-Sn
- 2998 *C S M Doake and P W F Gribbon* · Vorticity at a grid in liquid He II
- 3012 *F A Wedgwood and Moshe Kuznietz* · Actinide pnictides and chalcogenides: I. Study of magnetic ordering and ordered moments in uranium monochalcogenides by neutron diffraction
- 3021 *J M Farley and G A Saunders* · Ultrasonic study of the elastic behaviour of calcium tungstate between 1.5 K and 300 K
- 3038 *R B Murray and A D Yoffe* · The band structures of some transition metal dichalcogenides: band structures of the titanium dichalcogenides
- 3047 *J P Gaspard and F Cyrot-Lackmann* · A generalized cumulant expansion for disordered systems
- 3061 *J-P Michenaud and J-P Issi* · Electron and hole transport in bismuth
- 3073 *M Giura, R Marcon, P Marietti and E Presutti* · Magnetoacoustic oscillations in Sn-doped Bi with the magnetic field orthogonal to the sound propagation: II. High magnetic fields
- 3085 *P F Fox and D S Gaunt* · Critical isotherm of the Ising ferromagnet with spin  $S > \frac{1}{2}$
- 3097 *J Zupan and D Kolar* · Optical properties of graphite and boron nitride
- 3101 *D J Newman and W Urban* · A new interpretation of the ground state splitting in  $Gd^{3+}$
- 3110 *J Duran and M Billardon* · Linear dichroism due to the stress-induced mixing of electronic states in anisotropic centres in cubic crystals: application to  $CaF_2:Pr^{3+}$
- 3126 *J R Sandercock, S B Palmer, R J Elliott, W Hayes, S R P Smith and A P Young* · Brillouin scattering, ultrasonic and theoretical studies of acoustic anomalies in crystals showing Jahn-Teller phase transitions
- 3147 *A J Nozik* · Mössbauer evidence for hole trapping by ferric acceptor states on rutile surfaces

## NO 22 14 NOVEMBER 1972

## LETTERS TO THE EDITOR

- L293 *A R Williams and Jane van W Morgan* · Multiple scattering by non-muffin-tin potentials
- L299 *E Tosatti, C Calandra, V Bortolani and C M Bertoni* · Dielectric matrix and covalent charge distribution of silicon
- L303 *P D Johnston and N J Stone* · The observation of an electric quadrupole interaction on dilute impurities of  $^{192}Ir$  in nickel using nuclear magnetic resonance on oriented nuclei

## PAPERS

- 3153 *A J Atkins and D L Misell* · Electron energy loss spectra for members of the mica group and related sheet silicates
- 3161 *Ashok Kumar and B Sharan* · Lattice dynamics and the heat capacity of indium
- 3164 *P N Butcher* · On the definition of energy dependent mobility and diffusivity
- 3168 *M A Moore and H C W L Williams* · Theory of hydrogen-bonded ferroelectrics: I
- 3185 *M A Moore and H C W L Williams* · Theory of hydrogen-bonded ferroelectrics: II
- 3222 *M A Moore and H C W L Williams* · Theory of hydrogen-bonded ferroelectrics: III
- 3245 *Norman J Morgenstern Horing and Robert W Danz* · Bernstein modes and the quasiclassical model of the quantum plasma in magnetic field
- 3253 *G M Copland and D J Newman* · Superexchange models: II. A new parametrization
- 3259 *A Barry Kunz, J T Devreese and T C Collins* · The rôle of the electronic polaron in the soft x ray absorption of the lithium halides
- 3264 *G J Keeler and D N Batchelder* · Far infrared absorption in solid argon with krypton and neon impurities

## NO 23 28 NOVEMBER 1972

## LETTER TO THE EDITOR

- L307 *S C Jain, D Pooley and Risal Singh* · Vibronic spectra of KBr containing  $MnO_4^-$  ions



## PAPERS

- 273 *A P Patro and P Sen* · Anomalous parapositronium lifetime in water at 20 °C
- 279 *M I Barker and T Gaskell* · Density fluctuations in simple liquids: a generalized hydrodynamic approach
- 289 *A H Opie and J Grindlay* · Calculation of the coefficients describing the linear dependence of the stress tensor on the second order material gradients of the displacement gradients: rare gas solids
- 296 *L B Pedersen, J W Martin and R M J Cotterill* · Interstitial migration in FCC lattice; a molecular dynamics study
- 309 *A I M Rae* · The lattice dynamics of HCN
- 322 *V Halpern* · The electronic density of states for some model disordered systems
- 332 *N Miura, R A Stradling, S Askenazy, G Carrere, J Leotin, J C Portal and J P Ulmet* · Anisotropic phonon coupling in the magnetophonon resonance in p type tellurium
- 349 *P Kocevar* · Non-ohmic transport and phonon amplification in polar semiconductors
- 371 *G S Rushbrooke, R A Muse, R L Stephenson and K Pirnie* · On randomly dilute ferromagnetic models
- 387 *J G Brankov, J Przystawa and E Praveczi* · Effect of crystal field anisotropy on the Curie temperature of an Ising ferromagnet: HTS expansion method
- 397 *R S Anderson, C A Bates and P C Jaussaud* · The properties of  $(3d)^4$  ions in corundum: I. APR spectra and their interpretation
- 414 *R S Anderson, C A Bates, P C Jaussaud and V W Rampton* · The properties of  $(3d)^4$  ions in corundum: I. Effects of electric fields on the APR spectra and lineshape analysis

## NO 24 12 DECEMBER 1972

## LETTERS TO THE EDITOR

- 4311 *I J McGee and R D Murphy* · A new ground-state wavefunction for liquid  $^4\text{He}$
- 4315 *R J Bell* · Localization in a topologically disordered chain
- 4319 *F Grandjean and A Gerard* · Interpretation of Mössbauer spectra of  $\text{Mn}_3\text{GaC}$  doped with  $^{57}\text{Fe}$
- 4322 *B N Misra and S K Gupta* · ESR hyperfine structure of free radical solutions

## PAPERS

- 429 *C Thibaudier and J Villain* · On the three dimensional eight-vertex model
- 438 *J L Beeby* · The scattering of atoms from surfaces: the one-phonon contribution
- 457 *J L Beeby* · The scattering of atoms from surfaces: II. The two-phonon terms
- 462 *J Bourne and R L Jacobs* · The band structure of GaN
- 469 *F Flores, E Louis and J Rubio* · Critique of the abrupt potential model in the theory of surface states
- 473 *O P Dago and W S Khokle* · Impurity core effects on electron mobility in n type silicon
- 477 *Y Shapira, B Fisher, B Pratt and A Many* · Measurements of acoustoelectric gain and lattice attenuation in n-GaAs
- 491 *H A Hillbrand* · High frequency behaviour of electron transfer in InP and GaAs from a dynamical Monte Carlo study
- 504 *T Kaneyoshi* · Contribution to the spin wave theory of amorphous ferromagnets
- 521 *A G Dunn and J W Essam* · Decoration transformations and the dilute anisotropic Heisenberg model
- 531 *A R Beal, J C Knights and W Y Liang* · Transmission spectra of some transition metal dichalcogenides: Group IVA: octahedral coordination
- 540 *A R Beal, J C Knights and W Y Liang* · Transmission spectra of some transition metal dichalcogenides: I. Group VIA: trigonal prismatic coordination
- 552 *S B S Sastry, V Viswanathan and C Ramasastry* · Thermoluminescence of x ray irradiated NaCl and NaCl:Pb crystals
- 566 *R C Kemp* · Electron spin resonance of  $\text{Fe}^{3+}$  in phlogopite

